CONDITION

Tracheomalacia - congenital

Congenital tracheomalacia is weakness of the windpipe present from birth, causing it to narrow during breathing.

WHAT IT IS
Weak, collapsible windpipe present from birth

BODY SYSTEM
Lungs and airways

MAIN SYMPTOMS
Barking cough, noisy breathing, breathlessness, recurrent chest infections

WHAT CAUSES IT
Abnormal airway development, often for unknown reasons

HOW IT IS DIAGNOSED
Dynamic bronchoscopy, sometimes dynamic CT

MAIN TREATMENT
Monitoring, airway clearance, breathing support, or surgery

CAN IT BE CURED?
Sometimes - severe collapse may improve after surgery

IS IT AN EMERGENCY?
Sometimes - blue skin, breathing pauses, or severe breathing difficulty

LONG-TERM OUTLOOK
Most children improve as airway cartilage strengthens

Overview

Congenital tracheomalacia is weakness of the trachea, or windpipe, that is present from birth. The trachea carries air from the throat toward the lungs. Rings of cartilage normally keep it open.

In tracheomalacia, this cartilage is softer or shaped differently. The back wall of the trachea may also move forward too easily. As a result, part of the airway can narrow or collapse, especially when a child breathes out, coughs, cries, or has a respiratory infection.

The amount of narrowing differs from child to child. Mild tracheomalacia may cause only a distinctive cough or noisy breathing. More severe narrowing can interfere with breathing, feeding, sleep, or clearing mucus from the lungs.

Symptoms may not be obvious immediately after birth. They can become clearer during the first weeks or months as the baby breathes more forcefully and becomes more active.

Congenital tracheomalacia is different from acquired tracheomalacia, which develops after birth because of factors such as prolonged pressure from a breathing tube, injury, or another illness. Sometimes the bronchi, the larger airways leading into the lungs, are also weak. This is called tracheobronchomalacia.

Symptoms

The symptoms and their severity depend on where the trachea narrows and how much it closes during breathing. Some children have symptoms only during a cold. Others have daily breathing or feeding difficulties.

Possible symptoms include:

The noise can be mistaken for asthma or another cause of wheezing. However, asthma medicines do not correct weak cartilage. Some children can have both asthma and tracheomalacia, so symptoms need careful assessment rather than assumptions based on sound alone.

Symptoms often worsen during respiratory infections because swelling and mucus make the already narrow airway smaller. Lying flat may also make breathing noisier in some babies.

- A loud, harsh, or "barking" cough
- Noisy breathing, including wheezing or a rattling sound
- Breathing that sounds worse during crying, coughing, feeding, or activity
- Frequent or slow-to-clear chest infections
- Difficulty clearing mucus
- Fast or laboured breathing
- Chest pulling inward around the ribs or breastbone
- Choking, coughing, or breathlessness during feeding
- Poor weight gain when breathing or feeding takes extra effort
- Brief pauses in breathing or blue-grey skin in severe cases

Causes and risk factors

Congenital tracheomalacia develops when the structures supporting the trachea do not form in the usual way before birth. It is not caused by anything a baby or parent did.

In primary congenital tracheomalacia, the weakness occurs without another structure pressing on the trachea. The reason for the altered development is often unknown. It is not usually considered a directly inherited condition, although airway weakness can occur as part of some uncommon genetic or connective-tissue conditions.

Secondary congenital tracheomalacia occurs when another condition affects how the trachea develops or places pressure on it. Associated conditions can include:

A child can have more than one cause of airway narrowing. Finding out whether something is pressing on the trachea is important because it may change the treatment options.

- Oesophageal atresia, in which the swallowing tube does not connect normally
- Tracheoesophageal fistula, an abnormal connection between the windpipe and swallowing tube
- A vascular ring or sling, in which major blood vessels surround or press on the airway
- Certain heart, lung, chest, or skeletal differences present from birth
- Other conditions that affect cartilage or connective tissue

Diagnosis

Symptoms alone cannot confirm tracheomalacia. Noisy breathing, cough, and repeated infections can occur with several airway and lung conditions.

The main confirming test is dynamic bronchoscopy. During this procedure, a specialist passes a thin camera into the airway and watches how the trachea changes as the child breathes. "Dynamic" means the airway is assessed while it is moving, rather than only as a still image. Sedation or anaesthesia may be needed, depending on the technique and the child's age.

Bronchoscopy can show where the trachea collapses, how extensive the collapse is, and whether the bronchi are also affected. It may also identify mucus, inflammation, or another airway difference.

Dynamic CT uses a series of X-ray images to show the airway during breathing. It can help assess the trachea and nearby blood vessels or organs. Because CT involves radiation, the clinical team considers whether the expected information justifies the scan.

Other tests may be used to look for related problems rather than to confirm tracheomalacia itself. These may include chest imaging, heart ultrasound, swallowing tests, lung function tests in older children, or tests for reflux and aspiration. Aspiration means food, liquid, saliva, or

stomach contents entering the airway.

Treatment and management

Treatment is based on the effect of tracheomalacia on breathing, feeding, growth, sleep, and respiratory infections. The appearance of the airway on a scan or bronchoscopy is only one part of this decision.

Children with mild symptoms may need monitoring rather than a procedure. As they grow, their trachea becomes larger and its cartilage often becomes firmer. Follow-up allows the care team to check breathing, feeding, growth, and recovery from infections.

Mucus can become trapped behind a narrowed section of airway. Airway-clearance methods may help a child move mucus out of the lungs. These may include physiotherapy techniques or equipment selected and taught by the respiratory team. Good hydration and prompt assessment of significant respiratory infections may also be part of the plan.

Feeding support can be useful when a child coughs, chokes, tires, or becomes breathless during meals. A swallowing assessment may identify aspiration. Management then focuses on safer feeding and any underlying swallowing or oesophageal problem.

Some children need non-invasive breathing support, such as continuous positive airway pressure, or CPAP. This provides gentle air pressure through a mask to help hold the airway open. More intensive breathing support may be needed during a serious infection or after surgery.

Medicines do not make weak cartilage firm. They may still be used for a separate condition, such as infection, asthma, or clinically important reflux. Treatment should be aimed at a problem that has actually been identified because some common breathing medicines may not help tracheomalacia itself.

Surgery may be considered when airway collapse causes severe breathing events, repeated serious infections, inability to come off breathing support, or major feeding and growth problems. The operation depends on the cause and location of the collapse.

Possible procedures include moving a blood vessel away from the trachea, attaching nearby tissues to support the airway, or reconstructing part of the trachea. A tracheostomy, which creates an opening into the windpipe through the neck, is sometimes needed for long-term airway and breathing support. Airway stents are used selectively because they can move, block with mucus, or irritate the airway.

Complications

Weakness of the trachea can make coughing less effective. Mucus may remain in the lungs, increasing the chance of repeated bronchitis or pneumonia. Long-lasting mucus blockage and infection can sometimes damage the smaller airways, a condition called bronchiectasis.

Children with substantial breathing effort may tire during feeding or use more energy to breathe. This can contribute to poor weight gain. Swallowing problems or aspiration can further increase the risk of chest infections.

Severe airway collapse may cause low oxygen levels, pauses in breathing, or respiratory failure. These complications are not typical of every child with tracheomalacia, but they need urgent assessment when they occur.

Complications can also come from an associated condition, such as a vascular ring or tracheoesophageal fistula. This is why care may involve respiratory, airway, heart, digestive, surgical, feeding, and speech and language specialists.

Prevention

Congenital tracheomalacia cannot usually be prevented. It develops before birth, often without a known cause. Routine choices during pregnancy are not known to cause an isolated case.

There is no established screening test that predicts most cases before birth. When tracheomalacia is part of a broader genetic or congenital condition, a genetics professional may help a family understand that specific condition and the chance of it occurring again.

Although the underlying weakness cannot be prevented, avoiding tobacco smoke and other airway irritants may reduce extra coughing and irritation. Recommended vaccinations and good hand hygiene can lower the risk of some infections, but they cannot prevent every respiratory illness or prevent tracheomalacia itself.

Living with it and what to expect

Many children improve during infancy and early childhood as the airway grows and its cartilage becomes stronger. Breathing may gradually become quieter, infections may be easier to manage, and the barking cough may lessen. Improvement is not guaranteed at a particular age.

Symptoms can fluctuate. A child who is usually comfortable may have louder breathing and more difficulty clearing mucus during a cold. Families may be given an illness plan describing airway clearance, feeding changes, and signs that need medical review.

Some children continue to have a noticeable cough even when their breathing and activity are otherwise normal. Others need longer-term respiratory follow-up, especially if the bronchi are also weak or if there is an associated heart, oesophageal, or vascular condition.

Severe or complex tracheomalacia may persist beyond early childhood and may require surgery or breathing support. Recovery after an operation is individual, and follow-up remains important because mucus clearance, infection risk, or another congenital condition may still need attention.

Most day-to-day activities are guided by symptoms rather than the diagnosis alone. As children grow, many can attend school, play, and exercise normally. Children with ongoing breathing limits may need an individual plan for activity, respiratory infections, and school or nursery care.

When to get medical help

Arrange routine medical review if your child has ongoing noisy breathing, a persistent barking cough, repeated chest infections, feeding-related coughing, or poor weight gain. A change from the child's usual pattern also deserves assessment, even if it does not seem like an emergency.

Contact the child's medical team promptly if breathing is becoming more difficult, feeding is repeatedly interrupted by coughing or breathlessness, or a respiratory infection is not following the expected recovery pattern.

Seek emergency help if your child:

If you have been given an individual emergency plan, follow it while arranging help.

- Has blue, grey, or very pale lips or skin
- Stops breathing or has repeated breathing pauses
- Is struggling for each breath or has marked chest pulling
- Cannot drink because of breathing difficulty
- Becomes unusually drowsy, floppy, or difficult to wake
- Has a severe choking episode or suddenly cannot move air

Common questions

Does congenital tracheomalacia go away?

It often improves as a child grows and the tracheal cartilage becomes firmer. Mild cases may cause few or no lasting limitations. Severe cases or those linked to another congenital condition can persist and may need surgery or long-term support.

Is tracheomalacia the same as asthma?

No. Tracheomalacia is caused by a weak, collapsible airway. Asthma involves tightening and inflammation in the smaller airways. They can sound similar, and a child can have both, but the treatments are not the same.

Why is my child's breathing worse with a cold?

A respiratory infection causes swelling and extra mucus. Both reduce the space available inside an already narrow airway. Coughing also creates pressure changes that can make the trachea collapse more noticeably.

Can my child exercise and play normally?

Many children can. Activity is usually guided by breathing symptoms, oxygen needs, associated conditions, and advice from the child's care team. New breathlessness, blue colouring, faintness, or difficulty recovering after activity needs assessment.

Will my child need surgery?

Most children with mild tracheomalacia do not need surgery. An operation may be considered when collapse causes dangerous breathing events, major feeding or growth problems, repeated serious infections, or ongoing need for breathing support.

Is congenital tracheomalacia inherited?

Most isolated cases are not known to follow a simple inherited pattern. Tracheomalacia can sometimes occur with a genetic or connective-tissue condition. In that situation, the inheritance pattern comes from the underlying condition rather than from tracheomalacia alone.

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